

WHAT IS CLAIMED IS:

1. An advanced power distribution system including an uninterruptible transfer switch coupled to at least two power sources and a load comprising:
 - a first switch having a first and second end, said first end coupled to a first power source, said second end coupled to said load;
 - a second switch having a first and second end, said first end coupled to a second power source, said second end coupled to said load;
 - a control module coupled to said first and second switch, said control module capable of actuating said first and second switch in order to select said power sources received by said load;
 - an inverter for providing power to said load when said control module actuates said first and second switches;
 - a first rectifier, having a first and second end, said first end coupled to said first end of said first switch, said second end of said rectifier coupled to said inverter;
 - a second rectifier, having a first and second end, said first end coupled to said first end of said second switch, said second end of said second rectifier coupled to said inverter; and
 - a harmonic cancellation unit comprising a transformer and at least one filter for attenuating system harmonics.
2. An advanced power distribution system as recited in claim 1, further including a remote monitoring unit coupled to said control module for receiving and transmitting system information and allowing remote control of at least two of the advanced power distribution system state variables.
3. An advanced power distribution system as recited in claim 1 wherein said transformer windings have a zig-zag configuration with a single secondary winding.
4. An advanced power distribution system as recited in claim 1 wherein said transformer windings have a delta-wye configuration with a single secondary winding.
5. An advanced power distribution system as recited in claim 1 wherein said filter comprises a common mode filter connected to the neutral bus of said transformer and a differential filter connected to the secondary winding of said transformer.

6. An advanced power distribution system including an uninterruptible transfer switch coupled to at least two power sources and a load comprising:

a first switch having a first and second end, said first end coupled to a first power source, said second end coupled to said load;

a second switch having a first and second end, said first end coupled to a second power source, said second end coupled to said load;

A control module coupled to said first and second switch, said control module capable of actuating said first and second switch in order to select power sources received by said load;

an inverter for providing power to said load when said control module actuates said first and second switches;

a first rectifier, having a first and second end, said first end coupled to said first end of said first switch, said second end of said rectifier coupled to said inverter;

a second rectifier, having a first and second end, said first end coupled to said first end of said second switch, said second end of said second rectifier coupled to said inverter; and

a harmonic cancellation unit for attenuating harmonic frequencies.

7. The advanced power system recited in claim 6 further including surge suppressors coupled to said first ends of said first and second switch.

8. An advanced power system including an uninterruptible transfer switch coupled to a first power source, a second power source and a load comprising:

a first switch means for transferring power to said load, said first switch means having a first and second end, said first end coupled to a first power source, said second end coupled to said load;

a second switch means for transferring power to said load, said second switch means having a first and second end, said first end coupled to a second power source, said second end coupled to said load;

control means for actuating said first and second switch in order to select the power source received by said load, said control means coupled to said first and second switch;

60 inverter means for providing power to said load when said control means
61 actuates said first and second switches in order to alternate power source received by
62 said load;

63 an inductor means for electrically isolating said sources and inverter means
64 during switching of power from one power source to another, said inductor means
65 coupled to said load, said first and second switch, and said inverter;

66 a first rectifier means for providing power to said inverter means, said rectifier
67 having a first and second end, said first end coupled to said first end of said first
68 switch means, said second end of said rectifier coupled to said inverter means;

69 a second rectifier means for providing power to said inverter means, said
70 rectifier having a first and second end, said first end coupled to said first end of said
71 second switch means, said second end of said second rectifier coupled to said inverter
72 means;

73 a harmonic cancellation means coupled to said uninterruptible transfer switch
74 for attenuating harmonic frequencies.

75 9. A method of maintaining power quality in an advanced power distribution system
76 while switching power sources from a primary power source to an alternative power source
77 without appreciable power loss to the load comprising:

78 monitoring power quality of a preferred power source and an alternate power
79 source;

80 determining from a predefined set of power quality variables that the power
81 quality from the primary source has degraded to an unacceptable level;

82 opening all switches that route the primary power source to the load;

83 supplying power to the load from the inverter at the time that the primary
84 power source is disconnected from the load so that no appreciable power loss occurs
85 on the load;

86 slewing amplitude and phase of power provided by the inverter to the load so
87 that it substantially matches the amplitude and phase of alternative power source;

88 closing the switch that routes power from the alternative power source to the
89 load;

90 taking the inverter off line so that the load receives power from the alternative
91 power source without appreciable power loss on the load; and

92 attenuating harmonic frequencies in a transformer and filter to improve power
93 quality provided to said load.

- 94 10. A harmonic cancellation unit for attenuating harmonic frequencies in a power
95 distribution system comprising:

96 a transformer having a single secondary winding;

97 a filter coupled to said neutral bus of said transformer for attenuating at least
98 the 3rd harmonic;

99 a filter coupled to said secondary winding of said transformer for attenuating
100 at least one odd harmonic greater than the 3rd harmonic.